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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/523,141	01/31/2005	Suk-Won Chun	11281-065-999	1407

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EXAMINER	
EWALD, MARIA VERONICA	
ART UNIT	**PAPER NUMBER**
1722	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/523,141	CHUN ET AL.	
	Examiner	Art Unit	
	Maria Veronica D. Ewald	1722	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *09 May 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-22* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-13, 15-22* is/are rejected.

7)☒ Claim(s) *14* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *31 January 2005* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Allowable Subject Matter

13. Claim 14 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. The following is a statement of reasons for the indication of allowable subject matter: Prior art fails to teach, either alone or in combination, a spinning nozzle pack, wherein the electric connector is made in a shape of a conductor board or a stick of a predetermined length and has valleys and ridges periodically formed along a longitudinal direction thereof, and wherein the ridges are fit on the center of the spinning nozzles. Though the closest prior art reference of Kleinmeyer, et al. (U.S. 2002/0089094 A1) teaches an electrode mounted in the polymer solution such that the solution exits the nozzles or orifices in a charged state, Kleinmeyer, et al. fail to teach the configuration of the electrode wherein the electrode is specifically mounted on the spinning nozzles.

Claim Rejections - 35 USC § 102

14. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1 – 2 are rejected under 35 U.S.C. 102(b) as being anticipated by Kleinmeyer, et al. (U.S. 2002/0089094 A1). Kleinmeyer, et al. teach an apparatus for producing nanofiber utilizing electrospinning comprising: a supply unit for supplying polymer materials of the liquid state used to produce fibers (item 10 – figure 1; paragraph 0024); a spinning unit having a plurality of spinning nozzles for discharging the polymer materials supplied by the supply unit in a charged filament form (item 20 – figure 1; paragraphs 0024 – 0025); a collector installed below the spinning unit for piling the charged filament discharged by the spinning unit in a specific thickness (item 70 – figure 1); and a control unit charged to have a voltage of same polarity as one of the charged filament and positioned between the spinning unit and the collector for guiding the stream of the charged filament in order to prevent repulsion and dispersion of the charged filaments discharged from each spinning nozzle (item 55a, 56a – figure 1; paragraph 0039); wherein an induction unit is positioned between the control unit and the collector to surround the filament stream for inducing the charged filament stream passing through the control unit toward the collector, a voltage of same polarity as the control unit being applied to the induction unit (item 55b,56b – figure 1; paragraph 0039).

Claims 1, 3, 8 and 10 are rejected under 35 U.S.C. 102(e) as being anticipated by anticipated by Lee, et al. (U.S. 2002/0122840 A1). The applied reference has a common inventor with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 102(e) might be overcome either by a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not the invention "by another," or by an appropriate showing under 37 CFR 1.131.

Lee, et al. teach an apparatus for producing nanofiber utilizing electrospinning comprising: a supply unit for supplying polymer materials of the liquid state used to produce fibers (item 10 – figure 1a; paragraph 0025); a spinning unit having a plurality of spinning nozzles for discharging the polymer materials supplied by the supply unit in a charged filament form (item 20 – figure 1; paragraph 0025); a collector installed below the spinning unit for piling the charged filament discharged by the spinning unit in a specific thickness (item 50 – figure 1); and a control unit charged to have a voltage of same polarity as one of the charged filament and positioned between the spinning unit and the collector for guiding the stream of the charged filament in order to prevent repulsion and dispersion of the charged filaments discharged from each spinning nozzle (item 30 – figure 2a; paragraphs 0053 – 0054); wherein there is a transfer mount for reciprocating the spinning unit at a predetermined speed (item 26 – figure 2a; paragraph 0030); wherein the collector includes a conveyor belt rotating at a speed of about 0.1 to 30 m/min (item 50 – figure 1a; paragraphs

0075 and 0080); and wherein there is a carrier unit for carrying a piling material to which the charged filament is to be adhered and which is discharged to the collector (paragraph 0025).

Claim Rejections - 35 USC § 103

15. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 4 – 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over either Kleinmeyer, et al. or Lee, et al. in view of Haynes, et al. (U.S. 6,709,623). Kleinmeyer, et al. and Lee, et al. teach the characteristics previously described, however do not teach the presence of an air conditioner. Both, however, do teach several nozzle configurations, either in series or rows, and also teach that bulk polymer used to form the filaments are dissolved in solvents, of which solvents must be stable in the liquid state, but also evaporate quickly.

Haynes, et al. teach the use of an air knife (item 30 – figure 1), positioned between the spinning unit and collector to further consolidate the web of material onto the collector, while facilitating the process of drying the filaments before they adhere to the collector (column 7, lines 30 – 35).

Thus, it would have been obvious to one of ordinary skill in the art at the time of the Applicant's invention to modify the apparatus of either Kleinmeyer, et

al. or Lee, et al. with the air knife of Haynes, et al. for the purpose of expediting the evaporation of the solvent and thus, drying filaments in a shorter amount of time.

Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kleinmeyer, et al. or Lee, et al. in view of James, et al. (U.S. 7,018,188). Kleinmeyer, et al. and Lee, et al. teach the characteristics previously described but do not teach that the nozzles have gradually shorter lengths outward from the center nor teach the diameter sizes or material of the tubes.

In a method to form nanofibers, James, et al. teach a spin pack with a plurality of nozzles. The nozzles can have varied configurations. For example, the reference teaches that the nozzles can be of varying lengths, with gradually shorter lengths on the outer nozzles (figure 4a). The nozzles can extend away from the supply cavity in different amounts; some nozzles may extend beyond the cover plate (item 60 – figure 4a). James, et al. teach that there is a non-linear relationship between the nozzle extension relative to the downstream surface of the cover plate and the effect on fiber characteristics (column 9, lines 1 – 10). Thus, configuring a spin pack, such that the outermost nozzles are shorter in length may be desirable depending on the fiber characteristics that the user specifies. In addition, James, et al. teach that optimum inner and outer diameter dimensions for the tube are approximately 0.25 mm and 0.81 mm, respectively with a total length of 31.8 mm. All dimensions are within the range of 0.05 – 2 mm (inner diameter); 0.1 – 4 mm (outer diameter); 0.5 – 50 mm (length). Furthermore, the material of the nozzle pack can be metal (column 7, lines 14 –

15). In addition, the reference further teaches that there is a supply cavity (item 25 – figure 1), which is covered and connected to the spin pack assembly.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the Applicant's invention to configure the apparatus of either Kleinmeyer, et al. or Lee, et al. such that the nozzle lengths are gradually shorter at the outermost ends, with the dimensions and spin pack configuration of James, et al. for the purpose of producing filaments with varying characteristics, depending on specific requirements by the user.

Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kleinmeyer, et al. in view of Lee, et al. Kleinmeyer, et al. teach the characteristics previously described, but do not teach that the control unit is specifically distanced from the spinning nozzle between 1 and 20 cm.

In a method to form filaments discharged from a spin pack in a charged state, Lee, et al. teach that an optimum distance of 5 mm or more is needed between the conductor board and the nozzle to ensure adequate filament forming and piling (paragraph 0040). Furthermore, Lee, et al. teach several embodiments wherein the conductor board is separated from the nozzle by a distance of 1 cm to 1.2 cm. This produces some variation in the thickness of the accumulated material on the collector, but still maintains the optimum filament characteristics.

Thus, it would have been obvious to one of ordinary skill in the art at the time of the Applicant's invention to configure the distance between the control

unit and nozzle such that it is between 1 and 20 cm to ensure that the filaments are formed adequately, without being entangled with each other or warped.

Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kleinmeyer, et al. in view of Lee, et al. Kleinmeyer, et al. teach the characteristics previously described, but do not teach that the collector is a rotating drum rotating at a speed of about 5 – 50 rpm. Kleinmeyer, et al. do teach, however, that the collector surface can be a drum, a conveyor belt, an electrically-biased plate or any combination thereof (paragraph 0026).

In a method to form filaments discharged from a spin pack in a charged state, Lee, et al. teach that deposition time on the collector is a variable that can affect the thickness of the polymer web as it piles on the collector surface. Thus, deposition speed is considered a result-effective variable and can be optimized through routine experimentation. See In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the Applicant's invention to the speed of the collector unit at the ranges specified by the Applicant, depending on the optimum characteristics of the filaments desired, such as thickness and ply of the finished web.

Claims 11 and 17 – 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kleinmeyer, et al. Kleinmeyer, et al. teach a spinning nozzle pack for forming a polymer web by electrostatically spinning a solution used as a

fiber-forming material, comprising: a body having a supplier for supplying the solution (item 10 – figure 1; paragraph 0025); and a receiver for receiving the solution (item 20 – figure 1); an electric connector to be sunk in the solution for charging the solution (paragraph 0025); and a plurality of spinning nozzles, each having a capillary tube for discharging the solution charged by the electric connector in a fine filament form (paragraph 0024).

Kleinmeyer, et al., however, do not specifically teach that the electric connector is mounted on the body nor teach that the spinning nozzle is specifically combined in an orifice of the body and that the capillary tube is formed integrally with the body.

Kleinmeyer, et al. do indicate that the electrode can be positioned within the liquid polymer itself, which is similar to charging the die or the spin pack (paragraph 0025). Furthermore, Kleinmeyer, et al. teach that the main die can be configured depending on the user's specification – it may be comprised of individual capillaries and orifices mounted within the main die body (paragraph 0024).

Thus, because the electrode itself can be immersed in the solution, it would have been obvious to one of ordinary skill in the art at the time of the Applicant's invention to mount the electrode on the interior of the body so that it is immovably contacting the polymer solution to create a charged solution.

Furthermore, it would have been obvious to one of ordinary skill in the art at the time of the Applicant's invention to configure the die of Kleinmeyer, et al. such that the nozzles are combined within an orifice of the body or integrally

formed with the body, depending on the user's or the manufacturer's specification.

Claims 12, 18, 21 – 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kleinmeyer, et al. in view of James, et al. Kleinmeyer, et al. teach the characteristics previously described but do not teach that the nozzles have gradually shorter lengths outward from the center nor teach the diameter sizes or material of the tubes.

In a method to form nanofibers, James, et al. teach a spin pack with a plurality of nozzles. The nozzles can have varied configurations. For example, the reference teaches that the nozzles can be of varying lengths, with gradually shorter lengths on the outer nozzles (figure 4a). The nozzles can extend away from the supply cavity in different amounts; some nozzles may extend beyond the cover plate (item 60 – figure 4a). James, et al. teach that there is a non-linear relationship between the nozzle extension relative to the downstream surface of the cover plate and the effect on fiber characteristics (column 9, lines 1 – 10). Thus, configuring a spin pack, such that the outermost nozzles are shorter in length may be desirable depending on the fiber characteristics that the user specifies. In addition, James, et al. teach that optimum inner and outer diameter dimensions for the tube are approximately 0.25 mm and 0.81 mm, respectively with a total length of 31.8 mm. All dimensions are within the range of 0.05 – 2 mm (inner diameter); 0.1 – 4 mm (outer diameter); 0.5 – 50 mm (length). Furthermore, the material of the nozzle pack can be metal (column 7, lines 14 –

15). In addition, the reference further teaches that there is a supply cavity (item 25 – figure 1), which is covered and connected to the spin pack assembly.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the Applicant's invention to configure the apparatus of Kleinmeyer, et al. such that the nozzle lengths are gradually shorter at the outermost ends, with the dimensions and spin pack configuration of James, et al. for the purpose of producing filaments with varying characteristics, depending on specific requirements by the user.

Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kleinmeyer, et al. in view of Kaun (U.S. 5,435,708). Kleinmeyer, et al. teach the characteristics previously described but do not teach that the body of the nozzle pack is made of engineering plastic, though it is known that the nozzle pack and its body can be made of any suitable material.

For example, in a method to produce filament fibers, Kaun teaches that there is a nozzle head comprised of a bar-shaped horizontal plastic nozzle or spinneret (column 4, lines 3 – 5). The nozzle is further comprised of at least one row of orifices or openings, through which filaments are discharged (column 4, lines 5 – 9).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the Applicant's invention to configure the spin pack body of Kleinmeyer, et al. with a plastic body, as configured by Kaun, if so desired by the user, when producing the filament fibers.

Claims 15 – 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kleinmeyer, et al. in view of Wnuk, et al. (U.S. 6,604,928). Kleinmeyer, et al. teach the characteristics previously described but do not explicitly teach the presence of a filter prior to discharging the solution to the spinning nozzles. However, it is known to one of ordinary skill in the art to include a filter assembly with melt-spinning of fibers, since the polymer melt must be subjected to a super-fine filtration before passage to the spinneret plate (Wnuk, et al.; column 1, lines 18 – 20).

In a method to produce filaments via a spinneret, Wnuk, et al. teach that a polymer solution flows through a housing; prior to discharge to the spinning head (item 10 – figure 1), the solution flows through a filter element (item 18 – figure 1) which is comprised of filtering material (item 20 – figure 1). The filtering material is comprised preferably of a pleated filter cover of wire gauze or of a metallic non-woven fabric, especially in the form of high-quality steel (column 4, lines 20 – 25). In addition, prior to discharge to each nozzle and subsequent to filtering, the polymer solution passes through a distribution device (item 22 – figure 1). The filter element surrounds the distribution device, such that polymer flows radially from the exterior, inward, passing through the filter element, into the distribution device and to the spinneret (column 3, lines 65 – 67; column 5, lines 8 – 19).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the Applicant's invention to configure the spin pack of Kleinmeyer, et al. with the filter and distributor of Wnuk, et al. for the purpose of filtering the polymer solution prior to discharge to the spinneret.

Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kleinmeyer, et al. in view of James, et al. and further in view of Lu (U.S. 6,183,684). Kleinmeyer, et al. teach the characteristics previously but do not teach that the capillary tubes are angled between 3 to 60 degrees so as to have a shape of a circular cone. Furthermore, the capillary tubes, as taught by, James, et al. can be of several shapes, depending on the requirements specified by the user – for example, the capillary tubes can be generally circular or may be tapered to look like a cone, such that the downstream effective diameter is less than the upstream effective diameter (column 7, lines 14 – 20).

In a method to form filaments, Lu teaches the use of a spin pack or drawing unit (item 31 – figure 2), in which the upstream portion of the capillary tubes are greater and angled to be cone-shaped and decreasing in diameter towards the downstream or nozzle end (figure 2). The angle of the upstream portion is substantially between 15° to 60°, preferably between 30° to 45° (column 9, lines 35 – 40).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the Applicant's invention to configure the spin pack of Kleinmeyer, et al. with the cone-shaped capillary tubes of Lu for the purpose of producing the desired filament characteristics and based on the requirements as specified by the user.

Response to Arguments

16. Applicant's arguments, see pages 6 – 7, filed May 9, 2007, with respect to the rejection(s) of independent claim(s) 1 and 11 under 102(e) have been fully considered and are persuasive. Examiner agrees that the previously-cited reference of Haynes, et al. does not teach a spinning apparatus, wherein the filaments are discharged in a *charged form*. Haynes, et al. teach that the filaments are charged subsequent to exiting the orifices. Therefore, the rejection has been withdrawn. Furthermore, Examiner agrees that Kim does not teach an electric connector sunk in the body to charge the solution. The electrode of Kim is mounted external to the nozzle block and is not mounted in it nor can be sunk in solution.

However, upon further consideration, a new ground(s) of rejection is made in view of the references of Kleinmeyer, et al. and Lee, et al. Both Kleinmeyer, et al. and Lee, et al. teach a spinning device, wherein the nozzle(s) are charged, such that the polymer discharged through the orifices exit in a charged state. Furthermore, Kleinmeyer, et al. teach that an electrode can contact or be within the liquid polymer solution to charge it, thus, the electrode is sunk in solution.

Conclusion

17. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Maria Veronica D. Ewald whose telephone number is 571-272-8519. The examiner can normally be reached on M-F, 8 - 4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dr. Yogendra Gupta can be reached on 571-272-1316. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

MVE

ROBERT DAVIS
PRIMARY EXAMINER
GROUP 1300/1700

8/6/02